

Mathematics 8

Course Overview and Syllabus

Course Number: MA3108

Grade Level: 8

Prerequisite Courses: Math 7

Credits: 1.0

Course Description

The course begins with a unit on input-output relationships that builds a foundation for learning about functions. Students make connections between verbal, numeric, algebraic, and graphical representations of relations, and apply this knowledge to create linear functions that can be used to model and solve mathematical and real-world problems. Technology is used to build deeper connections among representations. Students focus on formulating expressions and equations, including modeling an association in bivariate data with a linear equation, and writing and solving linear equations and systems of linear equations. Students develop a deeper understanding of how translations, rotations, reflections, and dilations of distances and angles affect congruency and similarity. Students develop rules of exponents and use them to simplify exponential expressions. Students extend rules of exponents as they perform operations with numbers in scientific notation. Estimating and comparing square roots of non-perfect squares to perfect squares exposes students to irrational numbers and lays the foundation for applications such as the Pythagorean Theorem, distance, and volume.

Course Objectives

Throughout the course, you will meet the following goals:

- Effectively translate between graphic, numeric, symbolic, and verbal representations.
- Learn to select and use appropriate mathematical knowledge when investigating problems.
- Demonstrate an understanding of functions and use functions to represent quantitative relationships.
- Use linear equations and systems of linear equations to represent, analyze, and solve a variety of problems.
- Analyze two- and three-dimensional figures using distance, angle, similarity, and congruence.
- Develop and apply foundational mathematical skills such as the application of rational and irrational numbers.

Student Expectations

This course requires the same level of commitment from you as a traditional classroom course

would. Throughout the course, you are expected to spend approximately 5–7 hours per week online on the following activities:

- Interactive lessons that include a mixture of instructional videos and tasks
- Assignments in which you apply and extend learning in each lesson
- Assessments, including quizzes, tests, and cumulative exams

Communication

Your teacher will communicate with you regularly through discussions, e-mail, chat, and system announcements. You will also communicate with classmates, either via online tools or face to face, as you collaborate on projects, ask and answer questions in your peer group, and develop your speaking and listening skills.

Grading Policy

You will be graded on the work you do online and the work you submit electronically to your teacher. The weighting for each category of graded activity is listed below.

Grading Category	Weight
Quiz	20%
Test	30%
Exam	20%
Assignment	20%
Additional	0%
Project	10%

Scope and Sequence

When you log into Edgenuity, you can view the entire course map—an interactive scope and sequence of all topics you will study. The units of study are summarized below:

Unit 1: Input-Output Relationships

Unit 2: Linear Functions

Unit 3: Patterns in Bivariate Data

Unit 4: Linear Equations

Unit 5: Linear Systems of Equations

Unit 6: Transformations

Unit 7: Congruence and Similarity

Unit 8: Working with Exponents

Unit 9: Pythagorean Theorem and Irrational Numbers

Unit 10: Volume

Unit	Lesson	Lesson Objectives
Input-Output Relationships		
Graphing on the Coordinate Plane		
Create graphs from a table or situation and use them to solve problems.		
Identify and graph points in the coordinate plane, describing their relationship to axes and quadrants.		
Interpreting Graphs		
Analyze qualitative graphs.		
Create a graph to model a situation.		
Interpret information given in a graph.		
Tables, Graphs, and Equations		
Generate different representations of the same two-variable data.		
Recognize that tabular and graphical representations may be partial representations.		
Translate tables and graphs into equations.		
Introduction to Functions		
Determine if a real-world situation describes a functional relationship.		
Identify functions from tables, graphs, and equations.		
Linear vs. Nonlinear Functions		
Differentiate functions as either linear or nonlinear.		
Interpret the rate of change from a graph or table.		
Linear Functions		
Constructing Linear Functions		
Analyze linear functions to find the rate of change and initial value.		
Interpret the rate of change and initial value of a linear function in terms of the situation it models.		
Rate of Change and Introduction to Slope		
Compare positive slopes in a real-world situation.		
Determine the positive slope of a line from a table and a graph.		
Exploring Slope		
Determine the value of the slope of a line from a table or a graph.		
Recognize the difference between positive slope, negative slope, no slope, and zero slope.		
Proportional Relationships		
Compare proportional and nonproportional linear functions in the form of a table, graph, and equation.		
Determine whether a linear function is a direct variation.		
Solve problems involving direct variation.		
Slope-Intercept Form		
Analyze a graph to determine slope and y -intercept.		
Graph a linear function using the slope and y -intercept.		
Write a linear equation in slope-intercept form given the slope and y -intercept.		
Graphing in a Variety of Contexts		
Construct and analyze graphs given two components of a linear function.		
Estimate y -intercepts on a graph.		

Unit	Lesson	Lesson Objectives
		<p>Writing Linear Functions</p> <p>Compare and contrast using point-slope form and the slope-intercept form to get an equation to slope-intercept form. Write a linear equation in slope-intercept form given the slope and a point other than the y-intercept.</p> <p>Writing Linear Equations Given Two Points</p> <p>Write a linear equation in slope-intercept form given two points.</p> <p>Applying Linear Functions</p> <p>Determine what the slope and y-intercept are and what they represent in real-world functional relationships. Evaluate inputs and outputs for linear equations in slope-intercept form. Use real-world scenarios of linear functions to write an equation in slope-intercept form.</p> <p>Comparing Slopes and Intercepts</p> <p>Compare the slope and intercepts of linear functions, including when they are expressed as equations written in different forms. Determine slope and y-intercept of linear functions represented differently.</p>
Patterns in Bivariate Data		
		<p>Constructing Scatterplots</p> <p>Analyze a scatterplot. Classify dependent and independent variables. Create a scatterplot using a table of values.</p> <p>Interpreting Clusters and Outliers</p> <p>Analyze the influence outliers and clusters have on the data set. Explain the meaning of clusters and outliers in context. Identify clusters and outliers in a scatterplot and table of values.</p> <p>Exploring Association</p> <p>Analyze the correlation and association in scatterplots.</p> <p>Drawing Trend Lines</p> <p>Draw a line of best fit in scatterplots and identify its purpose. Use a graphing calculator to graph scatterplots and draw the trend line.</p> <p>Using Equations to Represent Trend Lines</p> <p>Create the linear equation of the trend line. Find and interpret the slope of a trend line.</p> <p>Making Predictions</p> <p>Analyze data to determine interpolations and extrapolations. Substitute x- and y-values into the data to create predictions of a real-world scenario. Use a calculator to graph a scatterplot and create line of best fit.</p> <p>Making Two-Way Tables</p> <p>Create a two-way table that organizes bivariate data. Determine the variables of a scenario in bivariate data. Label components of the two-way table appropriately.</p> <p>Interpreting Two-Way Tables</p> <p>Interpret and analyze a two-way table. Use frequencies to describe a possible association between two variables.</p> <p>Performance Task: Business Success</p>

Unit	Lesson	Lesson Objectives
Linear Equations		
Combining Like Terms to Solve Equations		
Determine and apply properties of equality when solving an equation.		
Identify and combine like terms to solve one-variable linear equations.		
Solving with the Distributive Property		
Justify the steps taken to solve one-variable linear equations involving the distributive property.		
Solve one-variable linear equations using the distributive property.		
Solving Equations with Rational Numbers		
Identify the least common denominator of fractions to combine like terms and solve equations.		
Solve one-variable linear equations with rational numbers using properties of equality.		
Modeling with Variables on Both Sides		
Use algebra tiles to model one-variable equations with variables on both sides.		
Use algebra tiles to solve one-variable equations with variables on both sides.		
Solving with Variables on Both Sides		
Determine and apply the steps needed to isolate a variable in a linear equation with variables on both sides.		
Solve equations with variables on both sides and verify the solutions.		
Solving Multistep Equations with Variables on Both Sides		
Build a process for solving multistep linear equations with variables on both sides.		
Solve multistep linear equations with variables on both sides and verify the solutions.		
Analyzing Solutions		
Identify equations that have one solution, infinitely many solutions, and no solution.		
Solve equations that have one solution, infinitely many solutions, and no solution.		
Write equations that have infinitely many solutions and no solution.		
Linear Systems of Equations		
Exploring Systems of Linear Equations		
Determine if a given coordinate point is a solution to a system of linear equations.		
Identify the unique solution of a system of two linear equations from a graph.		
Using Graphs to Determine the Number of Solutions		
Create a system of linear equations that has no solution, one solution, or infinitely many solutions.		
Determine the number of solutions of a system of linear equations from a graph or by inspection.		
Using Graphs to Solve Systems		
Determine the solution of a linear system from the graph.		
Graph linear systems on the coordinate plane.		
Rewrite a system of linear equations in slope-intercept form.		
Estimating Solutions of Systems		
Estimate solutions of linear systems graphically.		
Use intercepts to graph a system of equations given in standard form.		
Writing and Solving Systems		
Create systems of equations from mathematical problems.		
Solve systems of two linear equations.		

Unit	Lesson	Lesson Objectives
		<p>Using Substitution to Solve Systems Use substitution to solve a linear system.</p> <p>Rewriting Equations to Use Substitution Isolate one variable in a system of linear equations. Use substitution to solve a system of linear equations. Write and solve a system of linear equations from a real-world scenario.</p> <p>Using Addition to Solve Systems Use the linear combination method to solve linear systems.</p> <p>Multiplying One Equation to Solve Systems Solve a system using the linear combination method after multiplying one equation. Write equations of a linear system in standard form from a real-world scenario.</p> <p>Problem Solving with Systems Solve a system of linear equations. Write a system of linear equations to represent a real-world scenario.</p>
Transformations		
		<p>Congruence Determine the congruence of figures by measuring corresponding sides and angles. Identify and write corresponding parts of congruent figures.</p> <p>Overview of Transformations Identify types of transformations. Relate the result of a transformation to the original figure.</p> <p>Translations Describe a translation using coordinates. Identify and describe a translation on the coordinate plane. Translate figures on the coordinate plane given as an ordered pair and verbal expression.</p> <p>Reflections Describe a reflected figure using the line of reflection and coordinates. Identify and describe a reflection on the coordinate plane. Reflect figures on the coordinate plane given the line of reflection.</p> <p>Rotations Analyze a graph to determine the angle and direction of rotation of a figure. Identify the image of a figure after a given rotation.</p> <p>Rotations in the Coordinate Plane Describe the rotation of a figure using coordinates. Rotate figures on the coordinate plane given the degree and direction.</p> <p>Congruence and Transformations Describe a sequence of transformations that shows that a given pre-image is congruent to a transformed figure.</p> <p>Dilations Determine the result of a dilation given a center of dilation and the scale factor. Determine the scale factor of a dilation. Use proportional reasoning to determine if one figure is a dilation of another.</p>

Unit	Lesson	Lesson Objectives
		<p>Dilations in the Coordinate Plane</p> <ul style="list-style-type: none"> Describe the dilation of a figure on the coordinate plane by the scale factor. Use the scale factor to graph dilations on the coordinate plane. <p>Similarity and Transformations</p> <ul style="list-style-type: none"> Apply scale factor to find unknown side lengths of an image or pre-image after a dilation or sequence of transformations. Describe a sequence of transformations that result in a similar figure. Determine the similarity of figures by comparing corresponding side lengths and angle measures.
Congruence and Similarity		
		<p>Transversals</p> <ul style="list-style-type: none"> Determine angle relationships created by a transversal line intersecting two nonparallel lines. Find unknown angle measures created by a transversal intersecting two or more nonparallel lines. <p>Parallel Lines Cut by a Transversal</p> <ul style="list-style-type: none"> Determine if two lines cut by a transversal are parallel. Find missing measurements using angle relationships in a diagram of a transversal crossing parallel lines. Identify interior angles, exterior angles, alternate interior angles, and alternate exterior angles when a transversal crosses parallel lines. <p>Sum of Interior Angles of a Triangle</p> <ul style="list-style-type: none"> Determine the angle measures of interior angles of a triangle. Explain that the sum of the interior angles of a triangle is 180 degrees by rearranging the angles to create a straight line. Use angle relationships formed from parallel lines cut by transversals to establish facts about the interior angles of a triangle. <p>Exterior Angles of a Triangle</p> <ul style="list-style-type: none"> Determine angle measures of exterior angles of a triangle and the sum of exterior angles of a triangle. Identify exterior, adjacent interior, and remote interior angles of a triangle. Use angle relationships to establish facts about exterior angles of a triangle. <p>Similar Triangles</p> <ul style="list-style-type: none"> Analyze and apply third angle theorem and angle-angle criterion in similar triangles. Identify proportionality of side lengths to determine triangle similarity. Write similarity statements of similar triangles. <p>Similar Triangles and Slope</p> <ul style="list-style-type: none"> Find unknown measurements of similar triangles. Interpret similar triangles created by intersecting transversal and parallel lines. Use similar triangles in the coordinate plane to write linear equations. <p>Performance Task: Sign Production</p>
Working with Exponents		
		<p>Powers and Exponents</p> <ul style="list-style-type: none"> Evaluate powers using fractional and negative bases. Express a power of a positive integer base in expanded form. Express expanded form in exponential form. <p>Zero and Negative Exponents</p> <ul style="list-style-type: none"> Determine patterns of exponent values from a table. Evaluate powers of zero and negative exponents. Simplify expressions of zero and negative exponents.

Unit	Lesson	Lesson Objectives
		<p>Powers with the Same Base</p> <ul style="list-style-type: none"> Evaluate powers of the same base through multiplication and division. Simplify expressions of powers with the same base. <p>Raising a Power to a Power</p> <ul style="list-style-type: none"> Simplify and evaluate expressions of raising a power to a power of integer exponents. <p>Evaluating Expressions with Exponents</p> <ul style="list-style-type: none"> Evaluate expressions using substitution of the variables. Simplify expressions using the rules of exponents. <p>Introduction to Scientific Notation</p> <ul style="list-style-type: none"> Convert very small or very large numbers between scientific notation and standard notation. Order and estimate products and quotients of numbers written in scientific notation. <p>Operations with Scientific Notation</p> <ul style="list-style-type: none"> Evaluate products and quotients of scientific notation values. Identify proper units of measurement for quantities written in scientific notation. Recognize scientific notation answers generated by technology and identify the symbols associated with the value.
		<p>Pythagorean Theorem and Irrational Numbers</p> <p>Exploring the Pythagorean Theorem</p> <ul style="list-style-type: none"> Apply the Pythagorean theorem using Pythagorean triples as the side lengths. Identify sets of Pythagorean triples. Recognize perfect squares. Use Pythagorean triples to determine if a triangle is a right triangle. <p>Estimating and Comparing Square Roots</p> <ul style="list-style-type: none"> Estimate square roots without using technology. Make comparative statements involving square roots. Plot the estimated values of square roots on a number line. <p>Finding the Hypotenuse in Right Triangles</p> <ul style="list-style-type: none"> Approximate the length of the hypotenuse of a right triangle to solve real-world problems. Use the Pythagorean theorem to find the length of the hypotenuse of a right triangle. <p>Unknown Leg Lengths in Right Triangles</p> <ul style="list-style-type: none"> Approximate the length of a leg of a right triangle to solve real-world problems. Given the length of one leg and the hypotenuse of a right triangle, use the Pythagorean theorem to find the length of the other leg. <p>Converse to the Pythagorean Theorem</p> <ul style="list-style-type: none"> Determine if a triangle is a right triangle by using the converse of the Pythagorean theorem. <p>Finding Distance in the Coordinate Plane</p> <ul style="list-style-type: none"> Apply the Pythagorean theorem to find the distance between two points on the coordinate plane. Generate and use the distance formula to find the distance between two points on the coordinate plane. <p>Pythagorean Theorem in Three Dimensions</p> <ul style="list-style-type: none"> Identify diagonals and right triangles within cubes. Solve for unknown side lengths of right triangles within a cube.

Unit	Lesson	Lesson Objectives
		<p>Exploring Real Numbers</p> <ul style="list-style-type: none"> Classify numbers as rational or irrational numbers, and decimals as terminating or repeating. Determine sums and products of rational and irrational numbers. Express a repeating decimal with bar notation, and convert it to a fraction. <p>Performance Task: Architectural Works and Wonders</p>
	Volume	<p>Introduction to the Volume of a Cylinder</p> <ul style="list-style-type: none"> Apply the formula to find the volume of a cylinder. Recognize and identify parts of a cylinder. <p>Applications with the Volume of a Cylinder</p> <ul style="list-style-type: none"> Find unknown dimensions of a cylinder given its volume. Solve real-life problems using the volume of cylinders. <p>Introduction to the Volume of a Cone</p> <ul style="list-style-type: none"> Apply the formula to find the volume of a cone. Connect the volume of a cone to the volume of a cylinder. Recognize and identify parts of a cone. <p>Applications with the Volume of a Cone</p> <ul style="list-style-type: none"> Find unknown dimensions of a cone given its volume. Solve a real-world problem utilizing the formula for volume of a cone. <p>Introduction to the Volume of a Sphere</p> <ul style="list-style-type: none"> Apply the formula to find the volume of a sphere. Connect the volume of a sphere to the volume of a cylinder. Identify the parts of a sphere. <p>Spherical and Cubic Volume Applications</p> <ul style="list-style-type: none"> Apply volume formulas, including those that evaluate perfect cubes, to find unknown measurements. Recognize perfect cubes. Solve a real-world problem utilizing the formula for volume of a sphere.